

TITLE OF THE INVENTION

**METHOD AND DEVICE FOR OPERATING A MACHINE OF THE
TOBACCO PROCESSING INDUSTRY**

INVENTOR

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**METHOD AND DEVICE FOR OPERATING A MACHINE OF THE
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CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority under 35 U.S.C. § 119 of European Patent Application No. 03 013 931.5 filed June 20, 2003, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. **Field of the Invention**

[0002] The present invention relates to a process for operating a machine of the tobacco processing industry, in which at least one wrapping material strip that is provided for wrapping a rod of smokeable material or filter material is fixed in at least one predetermined position on its conveyor path from a wrapping material strip supply to a garniture device of the machine in order subsequently to be conveyed further from the predetermined position.

[0003] The present invention further relates to a device for feeding at least one wrapping material strip on a conveyor path to a feed element that feeds the at least one wrapping material strip to at least one rod of smokeable material or filter material of the tobacco processing industry. In this regard, a severing element is provided for splitting the at least one wrapping material strip and a fixing element is provided by which one end of the split wrapping material strip can be fixed.

2. **Discussion of Background Information**

[0004] A paper web feed device for a cigarette production machine is known from German Patent No. DE 36 00 321 C2, and its U.S. patent family member U.S. Patent No. 4,648,409 A. A suction drum is provided for conveying at least one paper web to a garniture belt. Via an activating device on which a knife is provided, it is possible to sever the paper web when the imprint applied to the cigarette paper is no longer defective after a start-up of the cigarette production machine. With this device, a so-called start-up section or the rejected material is thus eliminated upon return to service. At the return to service or start-up of the

cigarette production machine, a manual intervention is necessary to thread the paper web after a machine stoppage.

[0005] In the event of a tear of the wrapping material strip and also at a first start-up of the rod maker, it is necessary to feed the wrapping material strip manually to a feed element so that the wrapping material strip is conveyed to a garniture belt and finally to a garniture. In the cited German Patent No. DE 36 00 321 C2, and its U.S. patent family member, a manual feed is also necessary after an interruption of production.

[0006] This is relatively time-intensive and disruptive, particularly with twin-rod machines, and also leads to defective cigarette rods or filter rods. Here those breakdowns should be considered in particular after which the wrapping material strips regularly have to be threaded into corresponding elements. Furthermore, it is disadvantageous that, with an unintended tear in the wrapping material strip, an undefined amount of wrapping material strip can remain in the machine in the event of a stoppage of the same.

[0007] In order to combat these disadvantages, a process and a corresponding device were invented and filed in the German Patent and Trademark Office on February 7, 2002 by the instant assignee as German Patent Application No. DE 102 05 055.4, entitled "Method and Device for Conveying a Wrapping Strip in a Machine of the Tobacco Processing Industry." For an automatic start-up or return to service of a machine of the tobacco processing industry, the wrapping material strip was hereby fixed in a predetermined position in order to subsequently be conveyed further from the predetermined position. It was also provided to cut or generally sever the wrapping material strip accordingly. To this end, e.g., a knife or laser is provided.

[0008] When a paper tear occurs between the fixing element and the garniture belt in the device according to German Patent Application No. DE 102 05 055.4, it is difficult to remove the wrapping material strip that lies between the fixing point and the garniture belt.

SUMMARY OF THE INVENTION

[0009] In contrast to the foregoing, the present invention renders possible a good functionality with a corresponding process for operating a machine of the tobacco processing industry and a corresponding device, particularly when a paper tear occurs between a fixing point and a garniture belt.

[0010] Accordingly, the invention provides a process for operating a machine of the tobacco processing industry. In this regard, at least one wrapping material strip, which is provided for wrapping a rod of smokeable material or filter material, is fixed in at least one predetermined position on its conveyor path from a wrapping material strip supply to a garniture device of the machine in order subsequently to be conveyed further from the predetermined position. Further, before being fixed in the predetermined position, the at least one wrapping material strip is suctioned into a suction channel that branches off from the conveyor path.

[0011] Through the process according to the invention, the wrapping material strips are kept at uniform tension before they are fixed so that a defined fixing is possible. After the defined fixing, the reliable feed to the smokeable material or the filter material is possible.

[0012] If the at least one wrapping material strip is torn shortly before the suction channel, a safe continuation of the operation of the machine of the tobacco processing industry can be ensured in the event of faults, such as, e.g., differences in speed between the tobacco rod and the wrapping material strip in operation or differences in the stopping time of the distributor unit and the rod unit, which can lead, e.g., to a tear in the wrapping material strip or a tear in the rod. The tearing preferably occurs via compressed air.

[0013] If a wrapping material strip is torn in a twin-rod machine, it is logical to allow the second wrapping material strip to tear as well. To this end, it is provided to tear the second wrapping material strip shortly before the suction channel.

[0014] After the surplus wrapping material strip has been suctioned off, the suctioning into the suction channel is ended.

[0015] A very precise feed of the wrapping material strip is given when the at least one wrapping material strip is cut. This occurs in particular subsequently. The wrapping material strip is preferably conveyed to the garniture device afterwards.

[0016] In a particularly preferable embodiment of the process according to the invention, the suction channel is closed by an air curtain. Through the air curtain, the wrapping material strip is prevented from unintentionally reaching the suction channel or hitting a corresponding edge of the suction channel so that a defined conveying of the wrapping material strip would be no longer possible. The process according to the invention is preferably used in a twin-rod or in a four-rod machine in which two or four wrapping material strips are conveyed.

[0017] An intentional tear of the material strip does not usually take place with a single-rod machine, but in most cases only a cutting and fixing and a suctioning of the wrapping material strip remnant that is located between the fixing element and the garniture belt.

[0018] The invention provides a device for feeding at least one wrapping material strip on a conveyor path to a feed element that feeds the at least one wrapping material strip to at least one rod of smokeable material or filter material of the tobacco processing industry. In this way, a first severing element splitting the at least one wrapping material strip is provided and a fixing element is provided by which one end of the split wrapping material strip can be fixed. A suction channel is provided that branches off from the conveyor path.

[0019] By using the suction channel, it is possible to suction off wrapping material strips in a defined manner at a cut or a paper tear, so that no wrapping material strip remnants remain on the conveyor path to a feed element so that there are few breakdowns in the operation of the machine of the tobacco processing industry.

[0020] Preferably at least one first air nozzle is provided in the suction channel, by means of which nozzle a corresponding suction pressure or delivery air flow is formed. If at least one second severing element is provided, in the case of faults, the wrapping material strip can be torn in a defined manner, as already mentioned above. Preferably the second severing element includes a second air nozzle.

[0021] If at least one third air nozzle is provided to produce an air curtain, few faults or no faults at all occur during the feed of the wrapping material strip to the feed element.

[0022] One first air nozzle and/or one first severing element and/or one third air nozzle and/or one second severing element is preferably provided per wrapping material strip. In this case, each wrapping material strip can be conveyed in a defined manner.

[0023] A particularly simple and elegant embodiment is given when the fixing element is contained in the first severing element. The fixing element is preferably arranged upstream of the first severing element.

[0024] A rod maker according to the invention, in particular a filter rod maker or cigarette rod maker, includes at least one feed device according to the invention as described above.

[0025] The present invention is directed to a process for operating a machine of the tobacco processing industry that includes a wrapping material strip supply and a garniture device, in which a conveyor path is defined between the wrapping material strip supply and the garniture device. The process includes suctioning at least one wrapping material strip that is provided for wrapping a material into a suction channel that branches off from the conveyor path, fixing the at least one wrapping material strip in at least one predetermined position along the conveyor path, and conveying the at least one wrapping material strip along the conveyor path from the at least one predetermined position.

[0026] In accordance with a feature of the invention, the material can include one of a rod of smokeable material or filter material.

[0027] According to a feature of the invention, the process can further include tearing the at least one wrapping material strip shortly before the suction channel. Further, compressed air may be utilized to effect the tearing. The tearing may be performed while the at least one wrapping material strip is fixed in the at least one predetermined position. Also, after the tearing, the at least one wrapping material strip can be released from the at least one predetermined position to be conveyed along the conveyor path. Still further, after the tearing, the at least one wrapping material strip may be conveyed to the garniture device.

[0028] In accordance with still another feature of the invention, the process can include cutting at least one wrapping material strip. Further, after the cutting, a portion of the at least one wrapping material strip that is not being fixed can be suctioned into the suction channel.

[0029] Moreover, the process may include stopping the suctioning into the suction channel. The suctioning can be stopped by closing the suction channel with an air curtain.

[0030] The process can also include conveying the at least one wrapping material strip to the garniture device.

[0031] The instant invention is directed to a device for feeding at least one wrapping material strip. The device includes a feed element structured and arranged to feed the at least one wrapping material strip guided along a conveyor path to a material, a severing element structured and arranged to sever the at least one wrapping material strip, a fixing element structured and arranged to fix one end of the severed wrapping material strip, and a suction channel structured and arranged to branch off from the conveyor path.

[0032] According to a feature of the invention, the conveyor path can extend from a wrapping material strip supply to the feed element.

[0033] In accordance with another feature of the invention, the material can include a rod of smokeable material or filter material of the tobacco processing industry.

[0034] The device can further include at least one first air nozzle provided in the suction channel.

[0035] According to still another feature of the present invention, at least one second severing element is included. The at least one second severing element may include at least one second air nozzle.

[0036] In accordance with a further feature, the device can include at least one third air nozzle structured and arranged to produce an air curtain.

[0037] Further still, the at least one wrapping material strip can include a plurality of wrapping material strips, and for each wrapping material strip, at least one of: a first air nozzle positioned in the suction channel, a third air nozzle structured for producing an air curtain, a first severing element formed by a cutting device and a second severing element formed by a second air nozzle is provided.

[0038] A further feature of the instant invention includes that the fixing element may be contained in the severing element. alternatively, the fixing element may be arranged upstream of the severing element in relation to a wrapping material strip travel direction.

[0039] The present invention is directed to a rod maker that includes at least one feed device as defined above. Further, the rod maker can be structured and arranged as a rod maker and/or the rod maker can be structured and arranged as a cigarette rod maker.

[0040] The invention is directed to an apparatus for feeding at least one wrapping material strip from a wrapping material strip supply to a feeding device. The apparatus includes a conveyor path defined between the wrapping strip material supply and the feeding device, a suction channel positioned to branch off from the conveyor path, at least one severing element structured and arranged along the conveyor path, and a fixing element structured and arranged to positionally fix the wrapping material strip along the conveyor path.

[0041] In accordance with still yet another feature of the present invention, the fixing element is positioned upstream of the suction channel in relation to a

wrapping material strip travel direction. Further, the apparatus can further include at least one first air nozzle structured and arranged to guide the wrapping material strip along the conveyor path. The at least one severing element can include at least one second air nozzle positioned across the conveyor path from the suction channel. Further, the suction channel may include at least one third air nozzle structured and arranged to suction the conveyor path. Still further, at least one fourth air nozzle can be arranged at a junction of the conveyor path and the suction channel, such that the at least one fourth air nozzle is structured and arranged to create an air curtain to close off the suction channel.

[0042] Other exemplary embodiments and advantages of the present invention may be ascertained by reviewing the present disclosure and the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0043] The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of exemplary embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

[0044] Figure 1 diagrammatically illustrates a transverse section of a feed device according to the invention in a first process position, i.e., at the start-up of the rod maker;

[0045] Figure 2 diagrammatically illustrates a three-dimensional representation of the feed device according to the invention;

[0046] Figure 3 illustrates the feed device depicted in Figure 1 in the operating condition of the rod maker; and

[0047] Figure 4 diagrammatically illustrates the feed device depicted in Figure 1 at a process stage in which the remnants of the wrapping material strip are removed from the feed device after a tear of the wrapping material strip.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0048] The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

[0049] Figure 1 shows a diagrammatic cross-sectional representation of a feed device 1 according to the invention in a first process position. The principle of feeding a wrapping material strip or wrapping strip from a wrapping material strip supply to a garniture device is known from German Patent Application No. DE 102 05 055.4, European Patent Application No. EP 02 029 106.8-2313 and U.S. Application No. 10/355,005 of the assignee, the disclosures of which are expressly incorporated by reference herein in their entireties.

[0050] Within the scope of this invention, feeding the at least one wrapping material strip means in particular the transport of one end or start of the wrapping material strip from a wrapping material strip supply to the rod of smokeable material or filter material or the corresponding transport of the severed part of a wrapping material strip. In particular, this also means a feed to the rod for return to service of the rod maker. Within the scope of this invention, the term return to service also covers the term start-up.

[0051] The part of the rod maker that is shown in Figures 1 and 3 comprise in particular the feed device 1, by which a wrapping material strip 10 in the form of a cigarette paper can be fed from a wrapping material strip supply in the form of a bobbin first to a feed element 11 in the form of a deflection roller (see Figure 3). In this manner, wrapping material strip 10 subsequently is connected to a tobacco rod 12 above an opposed bearing 31, such that tobacco rod 12 in Figures 1 and 3 is

conveyed from right to left (in the direction of the arrow) by a rod conveyor belt 18. The assignee of the instant invention has obtained patents for an effective entrainment of the start of the wrapping material strip, e.g., EP 0 595 118 B1 and its U.S. patent family member U.S. Patent No. 5,361,783, the disclosures of which are expressly incorporated by reference herein in their entireties.

[0052] In order to ensure when the machine is started up or put into operation that the start of wrapping material strip 10 downstream of deflection roller 11 is entrained by relevant garniture belt 19 and relevant rod 12, it was proposed in the above-noted patents to arrange a displacement element above opposed bearing 31 that can be activated during feeding of the start of wrapping material strip 10 to reduce the spacing between rod conveyor belt 18 and wrapping material strip 10. This displacement element is not shown in the figures.

[0053] After garniture belt 19 is reached, which is deflected around deflection roller 30 and is fed to a garniture 20 for continuous wrapping of rod 12 with wrapping material strip 10, a frictional force between garniture belt 19 and wrapping material strip 10 is sufficient to transport wrapping material strip 10 in continuous operation. According to a further function of feed device 1, a knife 13 is mounted on a fastening plate 26 that can be moved in a linear manner crosswise to the conveying direction of the wrapping material strip 10 by a pneumatic cylinder 25 with rod guide.

[0054] Knife 13 engages with a cutting edge 22 to cut wrapping material strip 10. An opposed bearing 24 is also provided against which pressure surface 14 presses. During cutting of wrapping material strip 10 on cutting edge 22, one end of wrapping material strip 10 is pressed with pressure surface 14 against a surface of opposed bearing 24, thus, holding wrapping material strip 10. Cutting and fixing the one end of the severed wrapping material strip 10 takes place, e.g., in the event of a paper tear. If a paper tear occurs in only one web, before the cutting and fixing of the other web, the paper is severed by a second severing element 35.

[0055] Figure 1 shows feed device 1 at the start-up of the machine, such that wrapping material strip 10 is drawn into a suction channel 42 of a suction pipe 33. An air flow is used for this which is produced by first air nozzle 34. An air flow which is produced by second air nozzle 35 or several air nozzles 35 can support or help.

[0056] When the machine is first put into operation, upstream part 10" is threaded below into the feed device and then transported by an air flow produced by fourth air nozzles 38. The air pressure in suction channel 42 causes paper webs 10 to be kept at uniform tension. In this exemplary embodiment, only one single-rod maker is shown. However, the corresponding embodiments also apply to a twin-rod maker or a four-rod maker, such that the corresponding webs are then arranged one behind the other in the drawing plane. Through the uniform tension of wrapping material strips 10, differences in length between the webs, e.g., in a twin-rod maker, are compensated for and the cutting process can take place. Through the uniform tension it is also possible to obtain a very precise cut. A knife 13 is arranged on the drive unit and includes the pneumatic cylinder with a rod guide, and a pressure surface 14 that is arranged on a corresponding die for clamping the paper or wrapping material strip. Through moving out the drive unit or the pneumatic cylinder with rod guide 25, the wrapping material strips are held and cut cleanly at the same time.

[0057] The wrapping material strip section that is cut off is guided directly into suction channel 42. Now the suctioning is switched off and an air curtain 37 is built up by one or more third air nozzles 36. When pneumatic cylinder 25 is moved back, wrapping material strips 10 are transported by the air flow that is produced by third air nozzle(s) 36 and fourth air nozzles 38 to deflection roller 11 (e.g., driven by air) of feed device 1 or the threader to tobacco rod 12. Furthermore, fifth air nozzles 39 are provided that are used to drive deflection roller 11.

[0058] Air curtain 37 and the transport of wrapping material strip 10 with its upstream part 10' is shown in more detail in Figure 3. The operational position of the rod maker and, thus, the corresponding feed device 1 is shown.

[0059] In the case of faults such as, e.g., differences in speed between the tobacco rod and the wrapping material strip, or in the case of differences in the stopping time of the distributor unit and the rod unit which can lead to a tear in the paper or in the rod, the paper webs or wrapping material strips 10 are separated by compressed air from one or more fourth air nozzles 35. At the same time, suctioning in suction channel 42 is activated. This process requires the shortest switching times and airways. For this reason four quick-switch valves 41, which can be obtained, e.g., from Festo, Germany, are arranged in the region of the housing comprising a base body 27 and cover 28. One valve for suctioning and one valve for severing is provided for each wrapping material strip.

[0060] In Figure 2, in which quick-switch valves 41 are shown, two valves each are provided for two first air nozzles 34 or for four first air nozzles 34 when a twin-rod maker is used, and two further quick-switch valves 41 for two second air nozzles 35. The wrapping material strips are again kept at uniform tension by the air flow in suction channel 42 and the cutting process can take place. Subsequently the same process can start again from the beginning, in order to feed upstream part 10" of the cigarette paper strip that was severed and fixed, to deflection roller 11 again.

[0061] If the machine of the tobacco processing industry were to be shut down or if there is a pressureless machine condition, after switching off or during switching off of the machine or during faults in the pneumatic system, wrapping material strip 10 can be held in feed device 1 mechanically. To this end, a compression spring 40 is provided which presses pressure surface 14 against opposed bearing 24 when there is a lack of compressed air.

[0062] Figure 4 shows the operating condition in which a paper strip 10 that is or was torn between fixing element 14 and garniture belt 19, and is drawn into

suction channel 42 so as to remove this troublesome paper strip 10 from feed device 1. Upstream part 10" is hereby fixed in the fixing element on pressure surface 14 and opposed bearing 24. The paper strip located above cutting edge 22 was severed and is on the way to suction channel 42. In this position, air nozzles 38 and 39 are switched off.

[0063] It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

List of Reference Numbers

1	Feed device
10	Cigarette paper strip
10'	Downstream part of the cigarette paper strip
10"	Upstream part of the cigarette paper strip
11	Deflection roller
12	Tobacco rod
13	Knife
14	Pressure surface
17	Bobbin
18	Rod conveyor belt
19	Garniture belt
20	Garniture
21	Transport air
22	Cutting edge
24	Opposed bearing
25	Pneumatic cylinder with rod guide
26	Fastening plate
27	Base body
28	Cover
30	Deflection roller
31	Opposed bearing
33	Suction pipe
34	First air nozzle
35	Second air nozzle
36	Third air nozzle
37	Air curtain

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- 38 Fourth air nozzle
- 39 Fifth air nozzle
- 40 Spring
- 41 Quick-switch valve
- 42 Suction channel